Calculus Warm Up #1-2

1) Without a calculator, find the interval on which the function is decreasing.

$f(x) = 2x^3 - 10x^2 + 6x - 7$

2) Find the pt-slope equation of the line tangent

to $f(x) = \frac{3x}{2} - \sin x$, at $x = \pi$

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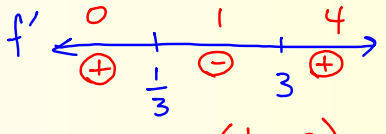


$f'(x) = 6x^2 - 20x + 6$

$0 = 2(3x^2 - 10x + 3)$

$2(3x - 1)(x - 3)$

decreasing on $(\frac{1}{3}, 3)$

2) Find the pt-slope equation of the line tangent

to $f(x) = \frac{3x}{2} - \sin x$, at $x = \pi$ → $y = \frac{3\pi}{2} - \sin\pi$

point of tangency $(\pi, \frac{3\pi}{2})$

$f'(x) = \frac{3}{2} - \cos x$

$f'(\pi) = \frac{3}{2} - \cos\pi$

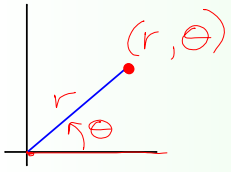
$= \frac{3}{2} + 1$

$= 5/2$

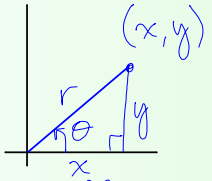
$y - \frac{3\pi}{2} = \frac{5}{2}(x - \pi)$

12.4 Polar Coordinates and Equations

(r, θ) r = directed distance from the pole (origin)
θ = angle of rotation about the pole
(usually from the positive x-axis)



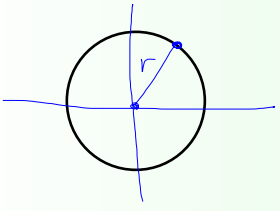
Related to the (x, y) coordinate system:



$x = r\cos\theta$
$y = r\sin\theta$

$\cos\theta = \frac{x}{r}$

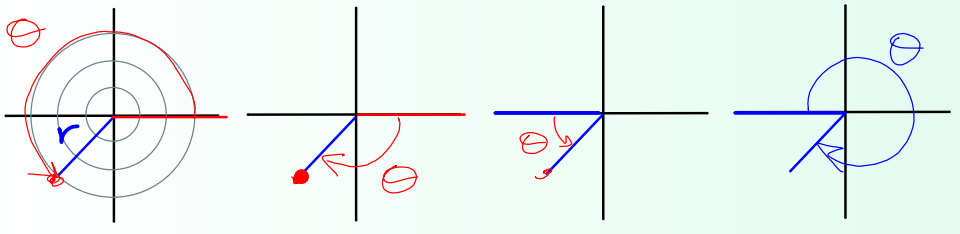
* Other useful relationships: $x^2 + y^2 = r^2$ and $\tan\theta = \frac{y}{x}$



Polar coordinates have multiple representations:

$(r, \theta) = (r, \theta \pm 2\pi n)$ Where n = any integer

Ex: $(3, \frac{5\pi}{4}) = (3, -\frac{3\pi}{4}) = (-3, \frac{\pi}{4}) = (-3, -\frac{7\pi}{4})$



$(-r, \theta) = (-r, \theta \pm (2n+1)\pi)$

r is positive when the initial side of θ is on the positive x-axis.
r is negative when the initial side is on the negative x-axis.

HW: Polar - Day 1 WS

answers follow

Polar WS Answers:

1) $(0, 4)$

2) $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

3) $(2, -2\sqrt{3})$

4) $(0, 0)$

5) $\left(\sqrt{2}, \frac{\pi}{4}\right)$
$\left(-\sqrt{2}, \frac{5\pi}{4}\right)$

6) $\left(5, \frac{3\pi}{2}\right)$
$\left(-5, \frac{\pi}{2}\right)$

7) $\left(\sqrt{6}, \frac{5\pi}{4}\right)$ & $\left(-\sqrt{6}, \frac{\pi}{4}\right)$

8) $r = 3$

9) $r = 2\cos\theta$

10) $r = 4\csc\theta$

11) $r = -\frac{2}{3\cos\theta - \sin\theta}$

12) $r = \frac{2}{4\cos\theta + 7\sin\theta}$

13) $\theta = \frac{\pi}{4} + \pi n$

14) $r = \frac{4}{1-\cos\theta}$ or $\frac{-4}{1+\cos\theta}$

15) $y = \frac{\sqrt{3}}{3}x$